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A series of numerical experiments to predict the evolution of the Gulf Stream have been performed, leading to the first system to show significant skill in this area. The forecast system uses the NOARL NW Atlantic regional primitive equation model and assimilation schemes which employ both a feature model and statistical correlations derived from the regional climatology of in situ data and long time-base numerical simulations. The evaluation criterion is the mean absolute distance between forecast locations of the Gulf Stream front and actual locations as verified from extensive satellite and in situ data. Eight one-week and five two-week evaluation intervals during 1986-1988 were selected to represent a variety of both active and inactive Gulf Stream regimes. To ensure objectivity, hindcasting was disallowed. The NOARL system provided forecasts which were significantly better than persistence at both one- and two-week intervals. This study indicates the feasibility of Gulf Stream forecasting using assimilation schemes which provide adequate deep information and numerical models which are designed to be consistent with available data.

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